

# The Financial Benefit of Energy Consumption Behavior Diversity Within an Energy Community

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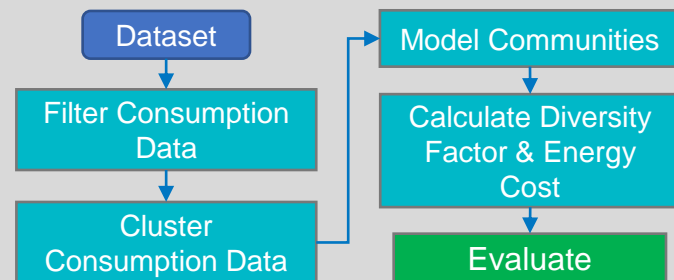
## Background

- Interest in renewable energy has risen
- Shift from larger companies to individuals
- Energy communities consisting of prosumers
- Not yet self sufficient → financial factors
- Combining loads within community

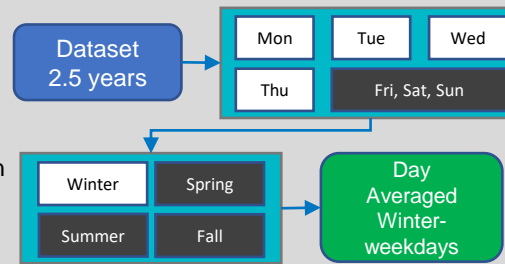
## Research Question

How does the diversity factor of consumption profiles in a community affect the energy costs?

## Method

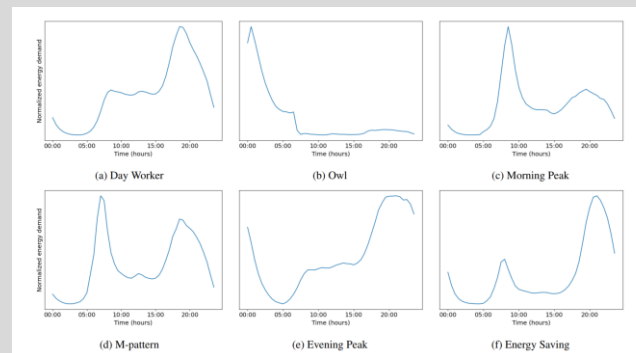


- Dataset is filtered on weekdays and winter
- Consumption data is day averaged

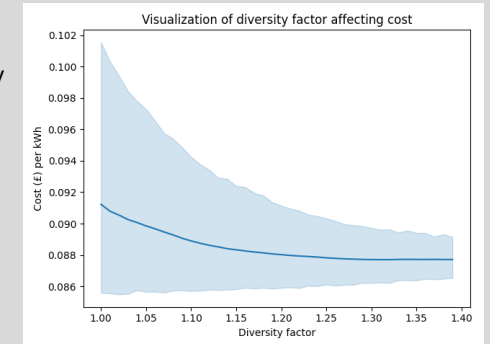


## Results

- Clustering consumption data using K-means
  - Relatively simple
  - Fast
  - Weaknesses
    - Unbalanced datasets
    - Overfitting
- Improvement Two-level K-means
  - Repeating K-means two times
  - First phase
    - Overestimate K for representatives
  - Second phase
    - Find optimal K for unique profiles



- Modelled communities of 200 prosumers
- Higher diversity factor → lower cost
- Depends on consumption profiles, alignment of residual demand and excess energy and community composition



## Conclusions & Future Work

- Diversity factor
  - Higher diversity factor → lower costs
  - Influence of consumption profiles and composition of community
- Future work
  - Other clustering methods
  - Different datasets
  - Best composition based on consumption profiles
  - Different community model